AMENDMENTS TO THE CLAIMS

The following is a complete, marked-up listing of revised claims with a status identifier in parenthesis, underlined text indicating insertions, and strike through and/or double-bracketed text indicating deletions.

LISTING OF CLAIMS

1. (Currently Amended)   An image sensor, comprising:

a plurality of row lines;

a plurality of column lines crossing the plurality of row lines;

a plurality of pixels, each of the pixels formed at a respective crossing of one of the plurality of row lines with one of the plurality of column lines, each of the pixels generating a charge based on light incident thereon and selectively transferring the charge to the respective column line in response to a single signal without receiving additional control signals, the single signal being received from the respective row line, and each of the pixels including only a photoelectric transformation element and a switching element; and

a plurality of column driver circuits, each column driver circuit associated with one of the column lines and configured to generate an output voltage based on the charge on the associated column line, each of the plurality of column driver circuits including,

a driver circuit including a drive transistor having a first electrode, a second electrode and a gate, the first electrode being connected to a supply voltage, the second electrode connected to a start circuit, and the gate controlling operation of the drive transistor based on the charge on the associated column line;

the start circuit including a start transistor connected between the drive transistor and an active load, with an output of the start transistor to the active load serving as an output of the column driver circuit; and

the active load including a load transistor connected between the start transistor and ground, wherein

the drive transistor, the load transistor and the start transistor are enhancement mode transistors, and

the start transistor is larger in size than the drive transistor and the load transistor.

2. (Previously Presented)   The image sensor of claim 1, wherein each pixel further comprises:

a transfer circuit configured to transfer the charge to the respective column line based on the single signal, the single signal being received from the respective row line, the transfer circuit including the switching element, wherein

the photoelectric transformation element converts incident light into a charge.

3. (Original) The image sensor of claim 2, wherein the photoelectric transformation element includes a photo diode.

4. (Previously Presented)   The image sensor of claim 2, wherein the switching element is a transistor and the transfer circuit is the transistor connected between the photoelectric transformation element and the respective column line and having a gate connected to the respective row line.

5. (Original) The image sensor of claim 4, wherein the transistor is a depletion mode NMOS transistor.

6. (Currently Amended)   The image sensor of claim 1, wherein ~~each column driver circuit comprises:~~,

[[a]]the driver circuit is configured to generate a voltage based on the charge on the respective column line; and

[[an]]the active load is connected between an output of the driver circuit and ground.

7. (Currently Amended)   The image sensor of claim 6, wherein ~~the driver circuit includes a~~the second electrode of the drive transistor ~~having a first electrode, second electrode and a gate, the first electrode being connected to a supply voltage, the second electrode serving~~serves as an output of the column driver circuit and connected to the active load~~, and the gate controlling operation of the drive transistor based on the charge on the associated column line~~.

8. (Currently Amended)   The image sensor of claim 7, wherein the ~~active load includes a~~load transistor is connected between the drive transistor and the ground.

9. (Currently Amended)   The image sensor of claim 6, wherein each of the column driver circuits further comprise~~comprises~~:

a reset circuit configured to selectively reset the charge of each pixel associated with the associated column line.

10. (Previously Presented)   The image sensor of claim 6, wherein the driver circuit generates a reference voltage when a reset circuit resets the charge of each pixel associated with the associated column line.

11. (Original)   The image sensor of claim 9, wherein the reset circuit includes a transistor connected between a supply voltage and the associated column line.

12. (Currently Amended)   The image sensor of claim 11, wherein the transistor of the reset circuit is a depletion mode NMOS transistor.

13. (Currently Amended)   The image sensor of claim 6, wherein the ~~column driver circuit further comprises:~~

~~a~~ start circuit is configured to selectively output the generated voltage as an output of the column driver circuit.

14. (Cancelled)

15. (Cancelled)

16. (Original)   The image sensor of claim 1, wherein the column driver circuit is configured to reset the charge of each pixel associated with the associated column line.

17. (Previously Presented)   The image sensor of claim 1, wherein one column driver circuit is associated with each of the column lines.

18. (Currently Amended) An image sensor, comprising:

a plurality of row lines;

a plurality of column lines crossing the plurality of row lines;

a plurality of pixels, each of the pixels formed at a respective crossing of one of the plurality of row lines with one of the plurality of column lines, each of the pixels[[pixel]]generating a charge based on light incident thereon and selectively transferring the charge to the respective column line in response to a single signal without receiving additional control signals, the single signal being received from the respective row line, and each of the pixels including only a photoelectric transformation element and a switching element; and

a plurality reset circuits, one reset circuit being associated with each of the column lines and configured to reset the charge of each pixel associated with the associated column line; and

a plurality of column driver circuits associated with the plurality of column lines, each of the column driver circuits including,

a driver circuit including a drive transistor having a first electrode, a second electrode and a gate, the first electrode being connected to a supply voltage, the second electrode connected to a start circuit, and the gate controlling operation of the drive transistor based on the charge on the associated column line;

the start circuit including a start transistor connected between the drive transistor and an active load, with an output of the start transistor to the active load serving as an output of the column driver circuit; and

the active load including a load transistor connected between the start transistor and ground, wherein

the drive transistor, the load transistor and the start transistors are enhancement mode transistors, and

the start transistor is larger in size than the drive transistor and the load transistor.

19. (Original)   The image sensor of claim 18, wherein each reset circuit includes a transistor connected between a supply voltage and the associated column line.

20. (Currently Amended)   The image sensor of claim 19, wherein the transistor of the reset circuit is a depletion mode NMOS transistor.

21. (Currently Amended)   An image sensing method, comprising:

selectively applying a plurality of voltages to a plurality of column lines of an image sensor in response to a single signal without receiving additional control signals, the single signal being received from each of a plurality of row lines, the plurality of voltages based on charges generated by a plurality of pixels of the image sensor, and each of the pixels including only a photoelectric transformation element and a switching element; and

generating, for each column line, a data voltage as an output voltage based on the applied voltage, the generating including,

a driver circuit including a drive transistor having a first electrode, a second electrode and a gate, the first electrode being connected to a supply voltage, the second electrode connected to a start circuit, and the gate controlling operation of the drive transistor based on the charge on the associated column line;

the start circuit including a start transistor connected between the drive transistor and an active load, with an output of the start transistor to the active load serving as an output of the generating; and

the active load including a load transistor connected between the start transistor and ground, wherein

the drive transistor, the load transistor and the start transistors are enhancement mode transistors, and

the start transistor is larger in size than the drive transistor and the load transistor.

22. (Currently Amended) The method of claim 21, further~~prior to the applying step,~~ comprising:

resetting the charge of each pixel prior to the selectively applying.

23. (Original)   The method of claim 22, wherein the resetting step simultaneously resets the charge of each pixel.

24. (Original)   The method of claim 22, wherein the resetting step includes applying a supply voltage to each column line to reset the charge of each pixel.

25. (Original)   The method of claim 22, further comprising:

generating a reference voltage as the output voltage after the resetting step.

26. (Original)   The method of claim 25, wherein the generating a reference voltage step generates the reference voltage until the applying step.

27. (Original)   The method of claim 22, further comprising:

repeating the resetting, applying and generating steps for each row of pixels in the image sensor.

28. (Original)   The method of claim 22, further comprising:

initializing the output voltage.